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## MONITORING OF THE STRUCTURE OF DENTOALVEOLAR ANOMALIES IN CHILDREN OF DONETSK REGION WHO SOUGHT ORTHODONTIC TREATMENT

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The purpose of the study was to research the structure of dentoalveolar anomalies in three age groups (7-9 years, 10-12 years, and 13-15 years) in 354 children of the Donetsk region on appeal. It was established that the main reasons children aged 7-15 sought the orthodontic treatment were anomalies of individual teeth and dentition. Only 9,0 % of the total number of children complained of having malocclusion. The structure of dentoalveolar anomalies was dominated by the combined orthodontic pathology. Anomalies of individual teeth and dentition in combination with an anomaly of occlusion were detected in 79,1% (280/354) of the total number of children examined. The most common anomalies of the dentition and individual teeth were narrowing (55,1%; 195/354) and shortening of the dentition (69,2%; 245/354), the vestibular position of the incisors or canines (52,5%; 186/354) and macrodontia of the teeth (25,1%; 89/354). Early extraction of primary teeth was observed in 50% (75/150) of the examined children in group 1. The most common bite anomaly in all age groups was distal bite (53,6%; 150/280) – 44,4%, 71,4%, 48,6%, respectively.

**Key words:** monitoring, dentoalveolar anomalies, children.

*The work is a fragment of the research project "To develop clinical and gnathological substantiation of the design and use of dental and tooth-gum guards for pathological erosion of teeth, which is complicated with defects of dentition", state registration No. 0117U005429.*

Harmonious facial aesthetics, proper bite, straight teeth are an integral part of the psychological confidence, personal and professional success of a modern person. Most dentoalveolar anomalies in children occur due malfunctions of the maxillofacial region, bad habits of sucking, early removal of infant teeth. Patients do not always notice the presence of these pathological etiological factors and turn to orthodontic care with a permanent bite, when the primary active growth of the jaw bones is completed and the pathology is formed. But in growing patients the possibility of orthodontic correction of both dentoalveolar and skeletal anomalies is higher. Therefore, the timely detection of dentoalveolar anomalies in the primary and mixed dentitions, and the patient's referral to the orthodontist can ensure a further decrease in the progression of the pathology or prevent it altogether, and plays an important role in the success of orthodontic treatment. Orthodontic pathology occupies the third place in the structure of dental diseases. [5, 7] The prevalence of dentoalveolar anomalies is high, and according to WHO, in the world it reaches 92%. [6] According to epidemiological data of domestic scientists, in various regions of Ukraine it is 40-95% [1, 4, 5].

As a region with a high level of man-made pollution, Donetsk region also has a high prevalence of dentoalveolar anomalies. In children 7-15 years of age, the percentages are 68-90%. [3, 9] All this determines the urgency of a detailed study of the structure of dentoalveolar anomalies in children that will allow planning the preventive and curative orthodontic care.

**The purpose** of the work was to study the structure of dentoalveolar anomalies in three age groups of children of the Donetsk region who sought orthodontic treatment.

**Materials and methods.** To realize the purpose of the study we analyzed the orthodontic status of 354 children in the Donetsk region who sought consultation from the Department of Dentistry No. 2 at the Donetsk National Medical University from 2017 to 2018. Taking into account the WHO recommendations, monitoring of the structure of dentoalveolar anomalies was carried out in three age groups: 1 group - 7-9 years old (early mixed dentition), 2 group - 10-12 years (late mixed dentition), 3 group - 13-15 years (permanent dentition). Group 1 consisted of 150 children. The total number of children in group 2 and group 3 was 104 and 100 children, respectively. According to the examination results, each study group was divided into two subgroups: subgroups A of groups 1, 2, 3 included children with anomalies of individual teeth and dentition; did not have malocclusion; subgroups B of groups 1, 2, 3 consisted of children who had a combined pathology, i.e. anomalies of individual teeth and dentition in combination with an anomaly of occlusion in any of the three planes (table 1).

Table 1

**Quantitative composition of study groups**

Group number	Number of children in subgroup A	Number of children in subgroup B
Group 1 (N=150)	24	126
Group 2 (N=104)	20	84
Group 3 (N=100)	30	70
Total (N=354)	74	280

Examination of children was carried out according to generally accepted methods in orthodontics, which included the collection of complaints, an anamnesis of life and illness, an external examination of the child and oral examination, study of jaw models, X-ray methods. The orthodontic diagnosis was performed using classifications of dentoalveolar anomalies by E. Angle, D.A. Kalvelis, and F. Khoroshilkina. The clinical trial material was subjected to variational-statistical analysis in accordance with the purpose of the study. The processing of the results was carried out using the generally accepted methods of mathematical statistics.

**Results of the study and their discussion.** An analysis of the data from the study indicates that among the total number of children (354) who applied for orthodontic care, the dominant age group was a group of patients with early mixed dentition (42.4%; 150/354). The distribution of patients by gender in groups 1 and 2 was almost uniform: 49.3% of boys and 50.7% of girls in group 1; 47.2% of boys and 52.8% of girls in group 2. At the same time, in group 3, the number of female patients was significantly higher (74.0%; 74/100). In our opinion, the high percentage of adolescent girls at this age is associated with the psychological aspects of an increased desire to have an aesthetic appearance of the maxillofacial system. The reason to seek medical help for all patients was an aesthetic anomaly of the dentoalveolar system, presenting as the anomalies of individual teeth and dentition. Only 9.0% (32/354) of all children complained of having malocclusion. Analysis of the orthodontic status of patients who sought medical advice showed that 20.9% (74/354) of children did not suffer from the pathology of occlusion. This category of patients was diagnosed with the anomalies of the Angle's I class (anomalies of individual teeth and dentition). Combined pathology, i.e. anomalies of individual teeth and dentition in combination with an anomaly of occlusion was detected in 79.1% (280/354) of children.

The study of the dentition anomalies revealed that the prevailing changes in the shape of the arches were in the transversal and sagittal directions. Narrowing of the dental arches was detected in 55.1% of children (195/354). Moreover, a decrease in the width of both dental arches was determined in 26.3% (93/354) and in one of the two arches - in 28.8% of the examined (102/354). The results of the study revealed that shortening of the dental arches was the most common deformation of the dentition; it was detected in 69.2% (245/354) cases. Moreover, both dental arches were often shortened (39.3%; 139/354). Shortening of one of the arches was revealed in 29.9% of children (106/354). Elongation of one or two dental arches was not widespread (11.0%; 39/354). Among 354 examined children, 133 children with crowded teeth were identified, which amounted to 37.6%. Moreover, crowding of the lower frontal segment prevailed (29.7%; 105/354). The crowded position of the teeth on both jaws was revealed only in 7.9% of the examined (28/354). Among the anomalies in the position of individual teeth in patients who sought orthodontic care, the most common problem was the vestibular position of the incisors or canines. This pathology was diagnosed in 52.5% of children (186/354). Oral position and tooth rotation were less common: 8.8% (31/354) and 17.8% (63/354), respectively. A significant number of children with macrodontia of teeth (25.1%; 89/354) was observed. Among the total number of children (354), non-physiological diastemata and tremata were found in 2.5% of cases (9/354). Primary adentia of permanent teeth (second premolars, upper lateral incisors) was radiologically detected in 6.2% of patients (22/354). Particular attention was drawn to the fact of a significant prevalence of distal (53.6%. 150/280) and deep (25.0%, 70/280) bites (table 2).

Table 2

**Prevalence of malocclusion among the total number of children**

Type of malocclusion	The frequency of the prevalence			
	N		%	
Distal bite	280	150	100	53.6
Mesial bite		16		5.7
Deep bite		70		25.0
Open bite		16		5.7
Cross bite		28		10.0

Results of the research into the structure of dentoalveolar anomalies by age groups showed that among the surveyed children malocclusion was detected: in subgroup B of group 1 – in 84.0% (126/150) of children, in group 2 – in 80.8% (84/104), in group 3 – in 70.0% (70/100). Distal bite had the highest prevalence in all age groups (44.4%, 71.4%, 48.6%).

In group 1, an assessment of dentition anomalies showed that narrowing and shortening of both dental arches were the most common pathology: 34.0% (51/150) and 44.0% (66/150), respectively. A decrease in the width and / or length of only one of the dentitions was observed in 28.0% (42/150) and 26.0% (39/150) of children. Lengthening of dental arches was diagnosed in 14.0% of children (21/150). Among 150 patients aged 7–9 years, 39 children (26.0%) with crowded teeth were identified. At the same

time, crowding of the frontal area on one jaw was much more common (22.0%; 33/150). The following features were revealed in the structure of anomalies of individual teeth in the examined children: the vestibular position of the teeth (usually the upper lateral incisors) in 54.0% (81/150) of patients; the oral position and rotation of the teeth had the same prevalence, which amounted to 18.0% (9/150; 9/150) cases; macrodontia was detected in 30.0% (45/150) of the examined; primary adentia of permanent teeth - in 6.0% of children (9/150). Early extraction of primary teeth was observed in 50.0% (75/150) of the examined children. In subgroup B of group 1, the second place in frequency of prevalence was occupied by the deep bite (28.6%, 36/126). Cross bite was diagnosed in 12.7% (16/126) of children in this subgroup. Mesial bite was found in 7.9% (10/126) of children. The presence of these bite pathologies in children of 7-9 years, in our opinion, can be explained by the uneven erosion of the tubercles of the primary teeth at this age and, as a consequence, the habitual mandibular displacement and the bite anomalies described above. The lowest percentage of the bite pathology was in children with an open bite (6.4%, 8/126).

Analysis of the dentition anomalies in group 2 revealed the following: shortening of the dentition in 78.8% (82/104) of children; narrowing of the dental arches in 42.3% (44/104) of the examined, with the upper dentition being narrowed more often (29.8%; 31/104); lengthening of the dentition in 11.5% (12/104) of children. Among 104 patients, 43 children (41.4%) with crowded teeth were identified. At the same time, crowding of the frontal lower segment was much more common (32.7%; 34/104). The structure of the anomalies of individual teeth in children of group 2 was represented by the following abnormalities: the vestibular position of the teeth in 54.8% (57/104) of patients; dental rotation was diagnosed in 24.0% (25/104) of children; oral position of teeth was found in 8.0% of cases (9/104); macrodontia was detected in 26.9% (28/104) of the examined; diastemata, tremata - in 8.7% of children (9/104). In children 10-12 years of age, in group 2, distal occlusion showed the prevalence increase by 1.6 times in comparison with the previous group (71.4%, 60/84). The number of deep occlusion cases (23.8%, 20/84) in this group decreased by 1.2 times as compared to the early mixed dentition of group 1, which could be due to self-regulation processes associated with the third physiological raise of occlusion. The remaining bite anomalies had a significant downward trend. The cases of treatment of patients with mesial and open bites were not recorded at all, and the prevalence of cases of cross bite decreased by 2.6 times and amounted to 4.8% (4/84). It is likely that this is the result of eliminating bad habits in an early mixed dentition.

The study of dentition anomalies in group 3 showed that narrowing and shortening of the dental arches had the same prevalence, which amounted to 58.0% of cases, respectively (58/100; 58/100). Lengthening of dental arches was diagnosed in 16.0% of the children (16/100). 51.0% of the children (51/100) had crowded teeth, and this pathology in the lower frontal region was diagnosed in 38.0% of cases. In the examined children of group 3, the following anomalies of individual teeth were diagnosed: the vestibular position of the teeth (usually canines) in 48.0% (48/100) of patients; tooth rotation was diagnosed in 29.0% (29/100) of children; oral position of the tooth – 13.0% of cases (13/100); macrodontia was detected in 16.0% (16/100) of the examined; primary adentia and retention of teeth in 13.0% (13/100) and 6.0% (6/100) of children, respectively.

In the third age group of 13-15 years, there was a slight decrease in the prevalence of distal and deep bites, but this pathology still had leading positions in the frequency. The prevalence of class II pathology was 48.6% (34/70), deep bite – 20.0% (14/70). The number of patients with mesial, open and cross bites was consistently low and amounted to 8,6% (6/70), 11.4% (8/70), 11.4% (8/70), respectively.

This study investigated the structure of dentoalveolar anomalies in three age groups of children of the Donetsk region who sought orthodontic treatment. The main reasons children aged 7-15 years old sought the orthodontic treatment were anomalies of individual teeth and dentition. Only 9.0% of the total number of children complained of having malocclusion. The structure of dentoalveolar anomalies is dominated by the combined orthodontic pathology, which is also confirmed in studies [2, 8]. Anomalies of individual teeth and dentition in combination with an anomaly of occlusion were detected in 79.1% of the total number of children examined. The most common bite anomaly in all age groups was distal bite (53.6%, 150/280) – 44.4%, 71.4%, 48.6%, respectively. Our conclusions are consistent with other scientific works [2, 6-8]. In our opinion, this can be explained by the unfavorable ecological situation in the Donetsk region, and as a consequence, the presence of a prolonged nasal breathing disorder in children. Deep bite also had a significant prevalence (25.0%; 70/280), which could be the result of fracture of crowns or early removal of primary molars at this age, the presence of harmful sucking habits. But the frequency of the pathology showed a consistent downward trend by a factor of 1.2 in children aged 10-12 and 13-15 years.

### Conclusion

Results of the study revealed a high prevalence of dentoalveolar anomalies in all age groups. In the structure of dentoalveolar anomalies, the pathologies of Angle's classes I and II had the highest prevalence. According to the authors, research of the prevalence of anomalies of occlusion in various life periods presents a significant scientific and practical interest. Such studies allow to improve the prevention principles of dentoalveolar anomalies and to organize the provision of specialized timely medical care.

*Prospects of further research include a more detailed study into the etiological factors of dentoalveolar anomalies in these groups of children.*

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### Реферати

#### МОНІТОРИНГ СТРУКТУРИ ЗУБОЩЕЛЕПНИХ АНОМАЛІЙ У ДІТЕЙ ДОНЕЦЬКОЇ ОБЛАСТІ ЗА ЗВЕРНЕННЯМ

Кобцева О.А., Заболотна І.І., Авдусенко М.В., Яров Ю.Ю.

Метою дослідження було вивчити структуру зубощелепних аномалій у дітей Донецької області, які звернулися за ортодонтичною допомогою, в трьох вікових групах (7-9 років, 10-12 років, 13-15 років). Оглянуто 354 дитини. Встановлено, що основною причиною звернення дітей 7-15 років до лікаря-ортодонта є наявність аномалій окремих зубів і зубних рядів. Тільки 9,0% від загального числа дітей пред'являли скарги на наявність неправильного прикусу. У структурі зубощелепних аномалій превалювала поєднана ортодонтична патологія (79,1%; 280/354). Найпоширенішими аномаліями зубних рядів і окремих зубів були звуження (55,1%; 195/354) і вкорочення зубних рядів (69,2%; 245/354), вестибулярне положення різців або іклів (52,5%; 186/354) і макродентії зубів (25,1%; 89/354). Раннє видалення молочних зубів було відзначено у 50% (75/150) обстежених дітей групи 1. Найпоширенішою аномалією прикусу у всіх вікових групах був дистальний прикус (53,6%; 150/280) - 44,4%, 71,4%, 48,6% відповідно.

**Ключові слова:** моніторинг, зубощелепні аномалії, діти.

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#### МОНІТОРИНГ СТРУКТУРИ ЗУБОЧЕЛЮСТНИХ АНОМАЛІЙ У ДІТЕЙ ДОНЕЦЬКОЇ ОБЛАСТІ ПО ОБРАЩЕННЮ

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Целью исследования было изучить структуру зубочелюстных аномалий у детей Донецкой области, обратившихся за ортодонтической помощью, в трех возрастных группах (7-9 лет, 10-12 лет, 13-15 лет). Осмотрено 354 ребенка. Установлено, что основной причиной обращения детей 7-15 лет к врачу - ортодонту является наличие аномалий отдельных зубов и зубных рядов. Только 9,0% от общего числа детей предъявляли жалобы на наличие неправильного прикуса. В структуре зубочелюстных аномалий превалировала сочетанная ортодонтическая патология (79,1%; 280/354). Наиболее распространенными аномалиями зубных рядов и отдельных зубов были сужение (55,1%; 195/354) и укорочение зубных рядов (69,2%; 245/354), вестибулярное положение резцов или клыков (52,5%; 186/354) и макродентия зубов (25,1%; 89/354). Раннее удаление молочных зубов было отмечено у 50% (75/150) обследованных детей группы 1. Самой распространенной аномалией прикуса во всех возрастных группах был дистальный прикус (53,6%; 150/280) - 44,4%, 71,4%, 48,6% соответственно.

**Ключевые слова:** мониторинг, зубочелюстные аномалии, дети.

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